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RESEARCH IN EDUCATION

An Introduction

BY

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AN INTRODUCTION

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PREFACE

This monograph seeks to present in a not too technical fashion the claims for research in Education. In America its publication might be regarded as superfluous, as a glance at the Bibliography appended to the concluding chapter will reveal; as, however, no previous work has appeared in Britain under this title, the writer hopes that the following pages may serve to focus increasing interest in this country on the subject of research in Education.

The origin of the monograph was an address delivered to Section L of the British Association at the Glasgow meeting in September, 1928, the fullest report of which appeared in *Education: Elementary, Secondary and Technical* for 12th, 19th and 26th October, 1928.

The writer is indebted to Dr. J. C. Jessop for reading the proofs.

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INTRODUCTION

In former days a course of training in teaching invariably opened with a discussion on the alternative: "Is teaching a science or an art?" But looking back on what then passed for School Management, one is bound to confess that teaching was neither a science nor an art. It was a superstition. A ritual had to be recited and incantations offered if the magical result was to be forthcoming. Thus in handwriting the pen had to be held lightly between the forefinger and the thumb, with the forefinger slightly bent; it had to pass between the second and third knuckles of the first finger and to point over the right shoulder; the wrist was to rest flatly on the paper and the copybook to lie parallel to the edge of the desk. Immediately after reciting this ritual, the teacher, to make up the attendances of his class, sat down, tilted the register till it made a decided angle with the edge of his desk, turned his hand over till it rested on its side, and pointed the top of his pen towards the window. Ritual and practice here conflicted; one procedure was taught to the pupils and another adopted by the teacher.

The best that could be said for the methods of teaching reading that were formerly recommended, is that the pupils learned to read not because of, but in spite of, the teaching. And in arithmetic, tables were chanted without the pupils having the slightest idea of their structure or significance, with the result that on the introduction of a new table some of the pupils concluded that it was a new song. Such flagrant contradictions evidently demand consideration and call for investigation.

To the question formulated at the outset of the first paragraph we can return the same answer as that said to have been given by Lord Morley on being asked if Politics was a science or an art : " It's a dodge." Teaching was likewise simple. All errors were due to the carelessness of the pupil, and there was one infallible cure—corporal punishment. The efficiency of the teachers' methods was above being questioned. No wonder the epitaph of the old-time teacher read : " Here lies one who wasted all his own time and most of other people's."

To remove these reproaches and provide teachers with a scientific technique is the aim of Research in Education, but obstructive tactics impede the general adoption of the scientific attitude.

Experience, it is maintained, is all that is needed in teaching, and advertisements still sometimes read: "Salary according to experience." One is nevertheless tempted to retort that experience may amount only to having done the wrong thing in the wrong way for forty years. It is claimed in confirmation of experience that we learn by doing, but we may remark that it is only successful practice that makes perfect, and that progress results from analysis of, and reflection on, our procedure. Experience in teaching is likewise of less value than in other vocations by reason of the isolation of the teacher. In other occupations craftsmen work alongside their fellows and by imitation adopt their more efficient and economical methods. Seldom, however, does a teacher in service see another teacher teach. Once trained, his certificate is endorsed with a life sentence of solitary confinement. Progress depending on experience is consequently accidental and slow, whereas research seeks to settle the question here and now; it avails itself of experiment rather than of experience.

When teachers cannot lay claim to experience they set up as a "defence mechanism" against the acquisition of a scientific technique the Personality of the Teacher. It is a comforting conception, and frequently covers a multitude of sins. It is indefinable, and each individual can thus delude himself into assuming that he possesses it in a peculiar degree, and the way to win the cheap applause of a teachers' meeting is to assert with emphasis that it does not matter whether or not they know the subjects they are teaching or know how to teach them; everything depends on the personality of the teacher. Even where the personality is a desirable one, it is a unique possession; it defies analysis and cannot be transmitted. It dies with its possessor. The technique based on experiment and research is definite and uniform; the means by which a result has been attained are carefully and accurately formulated; thus by eliminating as many variable factors as possible and controlling the conditions we can always secure the same result when the same procedure is adopted. We pass through research from subjective or personal experience to objective validity and universal applicability.

The teacher may protest that he has acquired a sympathetic understanding of his pupil and has no need for the results of research. Sympathy and insight are nevertheless not diminished but enhanced by scientific knowledge. For example, few teachers have ever encountered cases of colour blindness among their pupils, yet investigation reveals that about four per cent. of boys are colour blind, and serious injustice may be done to a pupil so handicapped by a teacher unaware of the defect; with all its acknowledged limitations the intelligence quotient or ratio is indispensable to the right assessment of a pupil's personality. Indeed, the complaint of the modern research worker in Education against the old-time teacher is not that he did not solve the problems of education, but that his self-complacency prevented him from seeing them.

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CHAPTER I

HISTORY OF RESEARCH IN EDUCATION

ALTHOUGH research in education is a fairly recent development, within the lifetime, indeed, of most of those engaged in it, difficulty is encountered in tracing its precise beginnings. An American publication entitled *Ten Years of Educational Research*, 1918–1927,[1] characterises educational research before 1918 as "The Pioneer Period."[2] Another American publication, *Organised Research in Education*,[3] devotes a chapter[4] to "Organised Educational Research in Other Countries"; Mr. W. H. Winch, of the London County Council inspectorate, assisting in the preparation of the section of this chapter on the status of organised educational research in Great

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[1] Walter S. Monroe, *Ten Years of Educational Research*, 1918–1927, "University of Illinois Bulletin," XXV, No. 51 (21st August, 1928); *Educational Research*, Bulletin No. 42. Bureau of Educational Research, College of Education. Urbana: University of Illinois, 1928.

[2] op. cit., ch. ii.

[3] Harold B. Chapman, *Organised Research in Education*, Ohio State University Studies. Bureau of Educational Research Monographs, No. 7. Columbus: The Ohio State University Press, 1927.

[4] ch. ii.

Britain, postulates 1888 as the year of origin of research in Britain. His statement reads[1]:

> As early as 1888, the members of the Teachers' Guild of Great Britain and Ireland were invited to contribute to a study of mental fatigue which Sir Francis Galton was then conducting. In the minutes of the annual meeting of the Guild held at Westminster Town Hall, it was reported that the Council of the Guild expressed a belief that the circulation of such questions as Sir Francis submitted might be productive of much good and might help "teachers to obtain . . . influence to which they are entitled and which they do not at present possess."

After referring to the effort of the Board of Education, begun in 1896, which, had it been conceived on more generous lines, might have developed into a Bureau of Educational Research, but which resulted merely in the issue of the Board's *Special Reports*, the account of research in Britain proceeds :

> One of the professional organisations that has consistently supported progressive movements in education is the Educational Guild, which was incorporated in May, 1883, under

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[1] op. cit., p. 5.

> the name, Teachers' Guild of Great Britain and Ireland. The Guild's interest in educational research assumed definite form in 1908. Then, at the suggestion of W. H. Winch—an inspector for the London County Council on leave of absence at that time for purposes of research—it created a sub-committee on Psychological Research in Schools. The title of this committee is somewhat misleading, as Mr. Winch pointed out in a letter to the writer. He said, "It should be a committee on educational research, especially in experimental pedagogy. The name was given at a time when it was thought that psychology as such could do more for education than it ever can."

We should nevertheless be inclined to assign the designation, "The Pioneer Stage" in educational investigation, to the period when Child-Study methods prevailed. This was the age of the questionnaire. The pitfalls of this procedure have been exposed by Thorndike[1] in dealing with "The Discovery of Original Tendencies by a Census of Opinions." He points out there that the ignorance of a thousand people is no better than that of one; truth cannot be manufactured from constant errors by getting a great number of them; and that no

[1] E. L. Thorndike, *Educational Psychology*, I, pp. 28–37. New York: Teachers College, Columbia University, 1913.

research can ever attain a reliability beyond that possessed by the data with which it starts. This objection has been more recently reiterated by B. H. Bode in his *Modern Educational Theories*[1]: "It has become a habit with us, when we are puzzled by a problem, to consult others who are equally puzzled or who perhaps have not reflected on the problem at all, and to evolve a solution out of our collective ignorance"; and by R. L. Finney in his *A Sociological Philosophy of Education*[2]: "A consensus of worthless opinions is a worthless consensus of opinion; and there is no magic in statistics that can give it worth." In *The Questionnaire in Education*[3] Koos has attempted to rehabilitate the questionnaire and concludes[4]: "Studies by questionnaire, as with studies by any other method, must be justified by two considerations. One of these is their value and the other is the possibility of a negative answer to the question: Can they be better made by any other method?" And in support of his contention that the questionnaire still holds a place in educational investigation, he cites the opinions of two eminent workers in educational research—Symonds and Buckingham. The former concedes that the questionnaire permits the gathering of much information obtainable in no other way; and the latter that the indiscriminate censure of the questionnaire is unjustified, that rightly used it is a proper and, indeed, an inevitable means of securing information.

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[1] p. 82. New York: The Macmillan Co., 1927.

[2] p. 17. New York: The Macmillan Co., 1928.

[3] Leonard V. Koos, *The Questionnaire in Education*: A Critique and Manual. New York: The Macmillan Co., 1928.

[4] pp. 148–149.

The transition to the scientific stage of educational research is marked by three features which appeared almost simultaneously:

(1) The adoption by educational science of the technique evolved in the psychological laboratory.

(2) The application to educational data of the methods of modern statistical science.

(3) The origin and development of mental testing.

The late Professor E. Meumann, of Germany, may be credited with the first application on an extended scale to educational problems of the technique of Experimental Psychology, and the publication of his *Vorlesungen zur Einführung in die experimentelle Pädagogik und ihre psychologischen Grundlagen*[1] in 1907, if not of the journal entitled simply *Die experimentelle Pädagogik*,[2] the first number of which was issued in 1905, may be said to initiate the new era. The effect of this tendency on educational research in this country was to restrict its prosecution to the very few who had both the training in a psychological laboratory and an acquaintance with German; as a result it was asserted not many years ago that the number in this country possessing the necessary equipment to undertake research could be counted on the fingers of one hand, and while this may have been flattering to those who assumed that they were included in the charmed circle, it antagonised teachers and made them suspicious of results obtained by methods beyond their ken.

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[1] Leipzig: Wilhelm Engelmann, 2 vols. The second edition in 3 vols. appeared in 1911.

[2] Wiesbaden: Otto Nemnich.

The application to educational data of a statistical technique originated about the same time and was likewise in part derived from psychology. Moede claims[1] that in Herbart's thesis out of a limited number of discrete mental elements the whole mental life could be built up in an exact fashion, was contained the mathematical deductive method. But it was the publication of Galton's *Inquiries into Human Faculty and Its Development* in 1883[2] that popularised the idea in this country that statistical methods could be profitably employed in social and educational surveys. H. O. Rugg, in his *Statistical Methods Applied to Education*, published in 1917,[1] says: "Prior to fifteen years ago 'pedagogy' had made no use of the large body of statistical technique that had been put together." This made further demands on the equipment of the research worker, and while there is a tendency of late to make the statistical procedure a substitute for, instead of a servant of, research, there are applications of this technique to the daily routine of the school[2] which to those of a mathematical bent would be worth the trouble involved.

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[1] W. Moede, *Experimentelle Massenpsychologie*, p. 25. Leipzig: Hirzel, 1920.

[2] Now available in Everyman edition.

Binet's invention of the intelligence scale, the three versions of which appeared in 1905, 1908, 1911, helped to remove educational research from the domination of Experimental Psychology; and whereas most writers on Mental Tests claim that "Binet's crowning glory is, not that he got together a medley of heterogeneous tests for the detection of the feeble-minded, but that he invented a scale," Binet's own account suggests that the feature which he regarded as of most significance was not the scale, but the standardis-

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[1] p. 3. Boston: Houghton Mifflin Co., 1917.

[2] Cf. J. M. Crofts and D. C. Jones, *Secondary School Examination Statistics*. London: Longmans, Green & Co., 1928; Terry Thomas, *The Science of Marking*. London: John Murray, 1930.

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ing of the questions, and it is this standardisation which entitles his work to be classed as "research."

The publication in the *Teachers College Record*, in March, 1910, of Thorndike's handwriting scale[1] proved that educational research had completely emancipated itself from psychology, and in his British Association Address in 1912 Sir John Adams did not hesitate to declare that Education had captured Psychology.

A brief review of the recent developments in Britain[2] may help to complete this historical survey. The London Head Teachers' Association[3] instituted a Research Committee and published supplements to *The Head Teachers' Review* under the title *Educational Research*. The first issue appeared in February, 1920, and the supplement continues to be published at irregular intervals. The committee was established more to enlist the interest of head teachers in research, familiarise them with the results and induce them to afford facilities for the application of these results in schools, than to conduct research, although its sub-committees have directed minor researches and reported the results in *Educational Research.*

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[1] E. L. Thorndike, "Handwriting," *Teachers College Record*, XI, No. 2. New York: The Columbia University Press.

[2] Cf. H. B. Chapman, *Organised Research in Education*, pp. 5–9.

[3] The Association is now entitled the National Association of Head Teachers.

A committee for Research in Education was founded in 1922 by the British Psychological Society with a view to fostering research in education and to encouraging co-operation between psychologists and educationists. In a memorandum issued to members of this committee the " General Aims " were summarised as follows :

> 1. To prepare and publish *periodical summaries* and references to recent and current educational research.
> 2. To *formulate problems* requiring investigation, and to discover persons able and willing to assist in these.
> 3. To give advice to individuals or societies who undertake research, and put these in touch with specialists.
> 4. To initiate and organise particular investigations.
> 5. To obtain grants for educational research.
> 6. To press for the more adequate psychological training of teachers, and for recognition of the general need for educational research.

The Forum of Education in November, 1925,[1] published an account of the committee's work up to that date under the title of "The Progress of Research," and from that article and later reports published in *The British Journal of Psychology*, it is evident that its function is mainly advisory, the committee not being able to employ investigators nor to undertake financial responsibility for investigations.

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[1] Vol. III, No. 3. This journal is now incorporated in *The British Journal of Educational Psychology.*

The National Union of Teachers on 3rd December, 1927, agreed in principle with the establishment of a Psychological and Educational Research Bureau, and referred the subject to its Education Committee for the consideration and formulation of schemes ; as no grant was voted, the efforts of the committee definitely to establish a bureau were frustrated. Nevertheless, the National Union, together with the Association of Education Committees, instituted a joint inquiry into "Examinations in Public Elementary Schools," a report under this title being published in 1930.[1] Among its recommendations are proposals for the continuance of inquiries of this character, particularly into the technique of examinations, and into the question of individual school records and leaving certificates. In association with certain Local Education Authorities the National Union, through a sub-committee appointed by the Education Committee to advise it on, and accept responsibility for, the supervision of any research which the Education Committee might authorise from time to time, undertook an investigation into "Sound Films in Schools."[1] On the recommendation of the sub-committee the National Union has also voted a sum of £500 for a six months' investigation to be conducted by the National Institute of Industrial Psychology into the heating, lighting, ventilation and fitting of schools; the County of Essex has been selected as the area of this inquiry; and a full report, it is expected, will be issued towards the end of the current year (1932).

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[1] Published jointly by "Education," Ltd. and "The Schoolmaster" Publishing Co.

Scotland has been more generous in its support of educational research, with the result that not only was the Scottish Council for Research in Education instituted,[2] but it has also continued to function. The evolution of the Council is outlined in the *First Annual Report.*[3] The Educational Institute of Scotland, the professional organisation of all grades of teachers in Scotland, appointed in 1919 a Research in Education Committee which investigated various educational problems and published the results of some investigations. Incidentally it performed excellent service in stimulating the interest of the teachers of Scotland in educational research and in familiarising them with the methods of investigation. Although it is now virtually superseded by the Scottish Council for Research in Education, it continues in existence, but restricts itself almost exclusively to awarding prizes for essays on research topics to students attending the various Scottish training colleges.

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[1] Report published by "The Schoolmaster" Publishing Co., 1931.

[2] 23rd June, 1928.

[3] pp. 5–7. Obtainable, together with the later Annual Reports, from The Secretary, 47 Moray Place, Edinburgh.

Whatever measure of success has attended the efforts of the Scottish Council for Research in Education is due largely to its representative character, the following educational bodies participating in its management: Association of Local Education Authorities, Educational Institute of Scotland, Association of Directors of Education, National Committee for the Training of Teachers, Training Centres and Colleges, The Universities of Scotland, The Scottish Branch of the British Psychological Society and The Association of School Medical Officers for Scotland. Some of its activities are instanced in the succeeding pages, and it is already recognised as an established feature of Scottish education.

CHAPTER II

CHARACTERISTICS AND TYPES OF RESEARCH

By contrast with the traditional methods in Education we are now in a position to formulate some of the general characteristics of research. Research is a point of view, an attitude of inquiry or a frame of mind. It asks questions which have hitherto not been asked, and it seeks to answer them by following a fairly definite procedure. It is not a mere theorising, but rather an attempt to elicit facts and to face them once they have been assembled. Many speakers ought, if they had the candour of Rousseau, to preface their remarks on educational topics with the statement in *The Origin of Inequality*—"Let us begin then by laying facts aside, as they do not affect the question." Research is likewise not an attempt to bolster up preconceived opinions, and it implies a readiness to accept the conclusions to which an inquiry leads, no matter how unwelcome they may prove. Thus there is a considerable body of evidence, the result of research in America, to suggest that reduction in the size of classes does not produce a compensating improvement in the pupils' achievement,[1] and in the absence of a change of technique on the part of the teachers made possible by the reduction in the number of pupils, one can well believe the statement. Whoever prosecutes research must be prepared for such shocks; and his standing as a research worker will in part depend on the frankness with which he states his conclusions, however unexpected or unpalatable.

When successful, research adds to the scientific knowledge of the subject. For this reason the statement that all thinking is original research for the thinker, is irrelevant; to be "original research" the conclusions must be new to all competent students of the subject.

Not only should educational research add to our knowledge of the subject, but, if it is to justify itself in public estimation, it should also lead to the introduction into schools of methods not at present practised. As Terman in his *Intelligence Tests and School Re-Organisation* says of mental tests[2]: "The purpose of intelligence tests is to make a difference in the educational treatment of pupils, not to furnish amusement to the teacher or to gratify an idle curiosity." This introduces the distinction between " pure research " and " practical research " which has been formulated as follows[1] :

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[1] Cf. B. R. Buckingham, *Research for Teachers*, p. 54.

[2] p. 26.

> Pure research has only two steps. First, a problem may be selected from any source, and secondly, a scholarly and careful solution must be found. In practical research there are five steps. (1) *A going concern is studied*, measurements made and points of weakness discovered. (2) Some one of these weaknesses is *selected* for investigation. (3) Then follows *solution in the laboratory*. (4) This is succeeded by the step of *installation*, in which modifications must be made so that the solution will work in practice. (5) Finally, the solution must be *maintained* by placing it into the organisation so that it will become a permanent part of the system. The pure research worker must, upon entering the practical research field, never lay the blame for the lack of use of his solution upon the organisation. It is absolutely essential that he consider the failure to use it to be a failure in his solution, and he must seek to make the necessary changes and set up the proper routine to secure its permanent use.

A change effected in a school system by practical research which short-circuited some of the above steps, may be instanced : the inclusion of a modified form of Thorndike's read-and-answer procedure[1] in a battery of mental tests applied in a Scottish county revealed such a condition of helplessness in reading-comprehension on the part of pupils taught in the traditional fashion that a campaign in favour of "silent reading" was launched with most gratifying results.

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[1] W. W. Charters, "Pure Research and Practical Research," *Journal of Educational Research*, XII, No. 2 (September, 1925), pp. 100–101.

If different aspects of a problem are to be investigated simultaneously to secure comparisons and correlations, the co-operation of different individual workers or of different teams is necessary. A good instance of "co-operative research" is the Harvard University Study of Growth.[2] Instead of working at cross purposes, individual workers, if organised, might while solving their own problems contribute at the same time data from which more general inferences might be drawn.

Research in Education is in danger of suffering from its present popularity. Some of the recent converts to research, making of necessity a virtue, delude themselves into believing that reliable results can be secured without adhering to any definite procedure and by ignoring the work that has been already expended on the subject by previous investigators usually better qualified. They believe in beginning at the beginning, coming fresh to it, as the Cambridge undergraduate replied when asked by his tutor why he was not prepared for an examination, and in the work which is being carried on by them under the designation of research the most elementary precautions are not observed.

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[1] E. L. Thorndike, "Reading as Reasoning : A Study of Mistakes in Paragraph Reading," *The Journal of Educational Psychology*, VIII, No. 6 (June, 1917), pp. 323–332.

[2] Outlined in *School and Society*, XXXI, No. 800 (26th April, 1930), pp. 574–577.

Much, too, that passes for research is mere repetition. When a clearly defined and well established technique is applied by a teacher to his own class and he derives from it a result valid only for that class, the proceedings can hardly be designated research and do not justify publication, although for the teacher himself the effort may be most profitable.

A general impression is abroad that if an inquiry is prosecuted on a sufficiently extensive scale, the highly specialised technique of research can be dispensed with. The haste to be rich nevertheless entails its own penalties in the educational as in the financial sphere, and if there is one virtue that research teaches, it is that of patience. Mass research, if it means merely a rapid slap-dash collection of unreliable data cannot be too strongly condemned ; it will achieve nothing and merely bring discredit on the research movement. Precedent provides a warning. One reason offered by Winch to account for the lack of provision for educational research in this country is that it is " partly due to the extravagances and inutilities which, with much that was most valuable, marked the early stages of the child-study movement and alienated the support of moderate-minded and practical persons."[1] And an objection contained in a paper communicated to the British Association at the Sheffield Meeting in 1910 by Dr. C. S. Myers deserves to be recalled :

> I want to protest as strongly as I can against the notion that any useful purpose can be served, so far as psychology is concerned, by collecting masses of psychological data with the help of an army of untrained observers. I have heard it confidently asserted that the gross errors inevitably arising from inaccuracies and inconsistencies of procedure among different observers cancel one another in the long run of such vast numbers of measurement. Nothing, I think, can be more dangerous or false than this idea that the untrustworthiness of crude methods diminishes as the number of observers increases. It involves the assumption that in the

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[1] H. B. Chapman, *Organised Research in Education*, p. 13.

long run errors occur to an equal extent in opposite directions—a most unlikely hypothesis.

The success attending the American army intelligence tests and the group-testing method modelled on the same lines seems to belie Myers's statement, but a consideration of this instance is suggestive. The development here was from individual testing to group testing. The great contribution of Binet to mental testing was, as we have already suggested, that he standardised the procedure of testing. The devisers of group tests adopted the same course, namely, standardisation of procedure ; and one of the chief means of rendering their tests fool-proof seems to have been the elimination of the teacher !

If mass investigation is not prepared to satisfy the requirements of scientific method and to avail itself of all the refinements of experimental technique, it cannot claim to be research work. The refined laboratory technique employed in individual testing may create the suspicion that its results have, after all, only a restricted application and may not be valid under the more complex classroom conditions. The conditions of the present-day classroom, it is contended, are totally different from the conditions of the laboratory, and those who have experience of both cannot but admit this contention. The experimentalist may nevertheless retort that the conditions of the laboratory and the conditions of the schoolroom as it ought to be, are not, after all, so very different, and he might even point to the fact that one of the modern developments in educational practice has adopted as its sub-title—"the laboratory method." Starch,[1] reporting the results of certain experiments carried out in an elementary school, concludes: "It would seem, therefore, highly desirable if there could be introduced into the schoolroom a similar atmosphere of motivation such as obtains in learning experiments in the laboratory."

The relative value of individual testing and group testing has still to be determined. We should know whether it is more profitable to test a thousand pupils individually or a hundred thousand with a group test. A Mental Survey of a complete age-group approximating to 100,000, together with the testing for comparative purposes of 1,000 pupils individually, projected by the Scottish Council for Research in Education, may throw some light on this problem.

There are certain aspects of social psychology, for example, the psychology of the class, which would be included in what the Germans designate

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[1] D. Starch, *Educational Psychology*, p. 165.

Massenpsychologie,[1] but these are not investigated by what would ordinarily be termed "mass methods," the technique of investigation being as elaborate as in individual research.

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[1] Cf. W. Moede, *Experimentelle Massenpsychologie.*

CHAPTER III

SCOPE OF EDUCATIONAL RESEARCH

Before dealing with the technique we must consider the extent of the field or the scope of educational research. The present tendency is not to restrict unduly the scope of educational research, but to include such aspects of research as historical, philosophical, survey or administrative, and experimental.[1]

The *historical* type of research is of value in enabling us to discount the influence of the past and to face present-day problems with confidence, if not with optimism. Nothing is more likely to depress the educational practitioner and to paralyse his efforts than the reiterated but quite unfounded statement that the present cannot compare with the old education. The glory of the past nevertheless tends to fade in the light of facts obtained by modern investigations. To the obstructionist who on principle objects to the introduction of anything new, historical research in education is disconcerting, for it has usually little difficulty in citing precedents for innovations; thus the present demand for Nursery Schools could readily support its claim by directing attention to the fact that a hundred years ago one of the greatest educational revivals that ever took place in Britain was a Nursery Schools movement, then termed Infant Schools, but admitting pupils from the age of three or even younger. The need for greater facilities for practical education might justify itself by citing the Minute of Committee of Privy Council on Education, 21st December, 1846: "Grants in Aid of Day Schools of Industry," under which provision was made for:

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[1] Cf. W. S. Monroe, *Ten Years of Educational Research*, p. 26.

1. School Field-Gardens.
2. Workshops for Trades.
3. School Kitchens and Washhouses.

The first section reads:

> If their Lordships are satisfied with the position of the field in relation to the school;
>
> With the rent;
>
> With the regulations for the management of the garden;
>
> And with the competency of the master to superintend the work and give the requisite instruction—
>
> Their Lordships will consider whether it may be expedient to make an annual grant,

> not exceeding one-half the rent, so long as the inspector may report that the field is skilfully and industriously cultivated ;
>
> To make a grant towards the purchase of tools in the first year ; and
>
> To grant a gratuity to the master in each year in which the instruction in industry is successful.

Research in the history of education, if properly directed, may reinforce progressive tendencies and should consequently not be ignored in, or excluded from, programmes of educational research.

An aspect of research allied to the historical is research in the *Sociology of Education*. Educationists who maintain that a certain validity attaches to the principle of recapitulation should investigate the mode of life and education of "our contemporary ancestors," the presently existing primitive peoples. Instances of what can be achieved in this field will be found in W. D. Hambly's *Origins of Education among Primitive Peoples*,[1] Nathan Miller's *The Child in Primitive Society*[2] and in the writings of Miss Margaret Mead.[3]

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[1] London: Macmillan & Co., 1926.

[2] London: Kegan Paul, 1928.

[3] E.g. "Adolescence in Primitive and Modern Society," *The New Generation*, Pt. II, pp. 169–188. London: Geo. Allen & Unwin, 1930.

A science of *Comparative Education* may come to be based on research. Comparative Education in the past has consisted largely of the personal impressions of some distinguished educationist of the educational systems of foreign countries visited by him ; in the future it is hoped that the application of standardised tests may permit of scientific rather than of invidious comparisons being drawn between countries. Thus the Scottish Council for Research in Education recently applied in a Scottish county to a complete age-group of almost 6,000 pupils an American achievement test[1] with interesting results.

If historical research is admitted then it becomes easier to justify the inclusion of *philosophical research in Education*,[2] which cannot adopt the precise methods of experiment, but may employ critical reflective thinking. Buckingham has said[1] :

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[1] Public School Achievement Tests. Battery A—Grades 3 to 8—Form 2. Bloomington, Illinois : Public School Publishing Co., 1928.

[2] A symposium on Philosophy and Research comprises B. R. Buckingham, " The Philosophy and Organisation of Research," *School and Society*, XXIX (15th June, 1929), No. 755, pp. 755–764. W. H. Kilpatrick, " The Relations of Philosophy and Science in the Study of Education," *School and Society*, XXX (13th July, 1929), No. 759, pp. 39–48. E. M. Freeman, " Criteria for Judging a Science of Education," *School and Society*, XXX (13th July, 1929), No. 759, pp. 48–52. G. S. Counts, " Criteria for Judging a Philosophy of Education," *School and Society*, XXX (27th July, 1929), No. 761, pp. 103–107. F. N. Freeman, " The Contribution of Science to Education," *School and Society*, XXX (27th July, 1929), No. 761, pp. 107–112.

> Just as I hold that both science and philosophy are needed in research, so I hold, too, that the methods of research are themselves applicable in the fields of science and philosophy. In other words, I recognise both scientific research and philosophical research.

Judd is quoted[2] as saying :

> While this method is not often used exclusively in educational research, it occupies an important place in many investigations. Indeed, it might be said that one of the greatest needs of education to-day is this type of research, in order that there may be developed a real philosophy of education that takes into account the most up-to-date contributions of modern science.

Recognition of the remaining forms of research is not likely to be contested. That problems exist in *educational administration* calling urgently for consideration is evident from the correspondence columns of the daily press ; on the financial side we have the relative contributions to educational expenditure of national and local funds ; the costs of administration, the function of inspection, of compulsory attendance officers ; on the more educational side the wastage in secondary education, the direction of pupils at the age of 11 + into the most profitable post-primary course. Thus, at the writer's suggestion, the Scottish Council for Research in Education constituted a committee "to explore the possibility of devising tests for determining *types* of ability at the qualifying stage, to enable pupils to be directed into the appropriate course, so that later vocational guidance may not be prejudiced by a school course unsuited to the capacity of the individual."[1] The results so far attained are distinctly promising.

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[1] B. R. Buckingham, "The Philosophy and Organisation of Research," *School and Society*, XXIX (15th June, 1929), No. 755, pp. 755–764.

[2] W. S. Monroe, *Ten Years of Educational Research*, p. 25.

The *organisation of education* presents innumerable problems for research, for example, the age of entrance to school, the most satisfactory size of class for the teaching of different subjects, the relative efficiency of collective and individual teaching, various aspects of examinations, e.g. the time devoted to examinations compared with that given to teaching. The determining factor in school work is doubtless the type and training of the teacher employed, and its significance was recognised by a research in America published under the title *The Commonwealth Teacher-Training Study*:

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[1] Scottish Council for Research on Education, *Third Annual Report*, 1930–1931, p. 12.

> Sponsors of the project have based their support on the hope that a comprehensive description of the duties and traits of teachers might provide the necessary basis for determining systematically what teachers should be taught. It was hoped also that the study might define criteria for teacher-training curricula, so as to eliminate much of the present duplication and supply many of the present deficiencies. With this hope the Committee on Administrative Units in 1925 initiated a three-year program of investigation and secured therefor a grant of $42,000.[1]

Research into the *Curriculum* has been extensively exploited in America. The adequacy of the principle on which this is based may be questioned and will be discussed later, but its importance cannot be questioned, for it is not until a decision has been reached as to what is to be taught that we can discuss intelligently the plan of the school building, the kind of equipment necessary, the form of organisation, the qualifications of the teacher, and the teaching methods to be employed.[1]

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[1] *The Commonwealth Teacher-Training Study*, directed by W. W. Charters and Douglas Waples, Preface, p. v. Chicago: The University of Chicago Press, 1929.

Methods of Teaching and of Learning readily suggest topics for research. We need only cite the investigations into the relative merits of deductive and inductive methods of teaching attacked as far back as 1913 by Mr. W. H. Winch and more recently by Dr. H. L. Fowler.[2]

The introduction into schools of the cinema and wireless has raised issues which it is realised can be settled only by research; thus in a field, namely, that of *educational apparatus and equipment*, where it was formerly regarded that there was no occasion for investigation, recourse is now naturally had to research. A good example is *The Value of Films in History Teaching*,[3] in which a serious attempt is made to apply the technique of research at present available; this cannot, unfortunately, be said of some other recent investigations on the cinema and wireless in schools, the reports on which are mere collections of pious opinions.

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[1] Cf. T. H. Briggs, *Curriculum Problems*, p. 1.

[2] W. H. Winch, *Inductive versus Deductive Methods of Teaching:* An Experimental Research. Baltimore: Warwick & York, Inc., 1913. H. L. Fowler, *Induction or Deduction?* An Experimental Investigation in the Psychology of Teaching. Issued by the Australian Council for Educational Research. Melbourne University Press in association with Messrs. Macmillan & Co., Ltd., 1931.

[3] Frances Consitt, *The Value of Films in History Teaching.* Being the Report of an Enquiry conducted under the auspices of the Historical Association with the aid of the Carnegie United Kingdom Trustees. London: G. Bell & Sons, Ltd., 1931.

Research even dares to invade the difficult and delicate sphere of *Moral Education*, and a series of studies in the nature of character has been projected, the first volume of which is published under the title of *Studies in Deceit*.[1] In fact, we can hardly be charged with undue optimism when we affirm that we are within sight of such an analysis of the pupil's personality as will confer on teaching a scientific title and give to teachers something of the same prestige as is at present bestowed by the public, in its ignorance, on the medical profession.

If, as suggested above, we recognise philosophical research, then there is no branch of educational activity beyond the scope of scientific inquiry directed and reinforced by the technique already, and yet to be, evolved by research.

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[1] *Studies in the Nature of Character by the Character Education Inquiry, Teachers College, Columbia University, in co-operation with the Institute of Social and Religious Research.* I, *Studies in Deceit*, by Hugh Hartshorne and Mark A. May. New York: The Macmillan Co., 1928.

CHAPTER IV

ORIGIN OF PROBLEM

The first difficulty that an investigator encounters is the selection of a topic that will repay investigation. At one time the cry in Education was for " Research " and " More Research," and it was apparently a matter of indifference what problems were selected ; now there is a tendency to call a halt, to take stock and to inquire before proceeding whether a research will be worth while.

Warnings have been issued as to " futile problems "[1] and it may be advisable to review the types of problems which can be so characterised. A type of futile problem that should be avoided is the problem that has been already solved. Ignorance is not originality. While one can sympathise with a student who after the expenditure of much thought and labour presents a research thesis only to have it rejected on the ground that the subject has been already adequately treated and the results published—perhaps in an obscure journal—there is an ignorance of the recognised sources which is culpable. Here the individual worker who has not at his command the resources of a Bureau or Institute of Research with references not only filed but readily accessible, is at a serious disadvantage and may even be deterred from initiating an investigation because of the difficulty or cost of determining whether the topic has been already treated. A mere collection of data does not constitute research, and if the data are not assembled to decide an issue formulated beforehand, the project had better be abandoned. Where precise data are not available or where we are dependent on vague opinions of untrained observers, the results are likely to be disappointing. Problems which involve the manipulation of too intricate statistical formulæ should be avoided. The statistical treatment only impresses the uninitiated, and there is as much dispute about the validity of certain statistical procedures as there is in regard to the connotation of "intelligence." There is at present a tendency to make mathematical manipulation take the place of the slower but surer method of the collection of accurate data. A research worker cannot proceed far without realising the need for an acquaintance with statistical procedure,[1] but this should be a servant of, and not a substitute for, research. In educational research, problems that produce mere averages of current opinions or practices are unprofitable, for, as Finney points out,[2] a cross-section of some prevailing popular or professional belief throws no light whatever on the validity of that belief, and Judd has repeated: "The time has come when averages will not satisfy. We must study fundamentals."

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[1] G. M. Whipple, " The Improvement of Educational Research," *School and Society*, XXVI, No. 661 (27th August, 1927), pp. 249–259; C. H. Judd, " Research in Elementary Education," *The Journal of Educational Psychology*, XVII, No. 4 (April, 1926), pp. 217–225.

What positive guidance, it may be legitimately demanded, can be afforded in the selection of problems. The treatment that follows has less impersonality than the writer would desire, but as research workers in recording their investigations adopt an objective standpoint and do not explain how they chanced upon the problems investigated, he has been compelled to draw upon his own experience for illustrations. It has been affirmed that there is a certain amount of accident in finding appropriate problems, just as there is a certain amount of luck in new inventions[3]; but usually it is the accident or luck of the person with knowledge and experience of the subject. As a fertile source of problems for educational research we should instance *practical difficulties in the classroom*; thus left-handedness, mirror-writing, stammering, colour blindness, have given rise to numerous investigations. The mind that notes *discrepancies* overlooked by others originates topics for research; the writer was thus led to investigate the origin of the training of teachers in Scotland[1] by reason of the conflicting dates assigned to this event by different writers and sometimes by the same writer. *Analogy*, the logicians advise us, is a treacherous basis of inference, but a fruitful source of hypothesis; we may consequently expect many research problems in education to be suggested by analogy. The earliest scale for the measurement of handwriting was Thorndike's,[2] the general impression produced by the samples on the valuers constituting the basis of construction; legibility as judged by the rate of reading of the samples was made the criterion of a later scale[3]; Freeman, however, analysed handwriting into uniformity of slant, uniformity of alignment, quality of the line or stroke, letter formation, spacing, and by assigning separate marks to each of these features produced the first analytic scale.[1] This suggested to the writer that English composition, instead of being assessed by general impression, should be analysed into its various elements and the value of each of these should be estimated separately.[2] That the analysis presents difficulties, and that the integrated whole has a value greater than the mere sum of these elements, are fully realised, but considerable progress has been made of late in the scientific analysis of composition,[3] and the uniformity of marking secured by this method, when compared with the considerable variations of marking by general impression of experienced examiners, more than counterbalances the loss of assessing by wholes. Twenty selected examiners marking independently twenty pupils' compositions, with 40 marks as maximum, attained as their most consistent result:

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[1] Cf. e.g. H. E. Garrett, *Statistics in Psychology and Education.* London: Longmans, Green & Co.

[2] Cf. *A Sociological Philosophy of Education*, p. 17.

[3] Verbatim Report of the Address on "Scientific Research as Applied to Industry," by the Rt. Hon. Sir Alfred Mond, Bart., LL.D., M.P., at the Institution of Civil Engineers, to a Joint Meeting of the Society of Chemical Industry and the British Science Guild on Tuesday, 15th May, 1928, p. 5.

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[1] *The Training of Teachers in Scotland:* An Historical Review. Edinburgh: The Educational Institute of Scotland, 1928.

[2] See p. 22.

[3] L. P. Ayres, *A Scale for Measuring the Handwriting of School Children.* Russell Sage Foundation Publications, No. 113.

20, 21, 24, 24, 25, 25, 25, 25, 25, 26, 27,
28, 28, 28, 28, 28, 30, 30, 30, 30;

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[1] F. N. Freeman, *The Teaching of Handwriting*. Boston: Houghton Mifflin Co., 1914.

[2] "Suggestions Towards an Analytic Scale in English Composition," *Educational Research*, Supplement to *The Head Teachers' Review*, I, No. 3 (October, 1920).

[3] Cf. *Curriculum for Pupils of Twelve to Fifteen Years*—Publications of the Scottish Council for Research in Education, III, pp. 28–49. London: University of London Press, 1931.

their least successful attempt being:

22, 23, 25, 25, 26, 30, 30, 31, 32, 33, 35, 35, 35, 35, 35, 35, 36, 38, 38, 40.

If the public is to preserve its faith in the professional competency of teachers, research in the marking of composition along new lines, doubtless analytic, is urgently required. Analogy as a source of problems for research suggests that as school pupils do not in games use the same size of bat or club, so in handwriting in schools they should not use the adult type of pen.

The *extension of previous investigations* is usually possible. The solution of one problem by research raises, Hydra-like, numerous other problems. Thus the attempt to establish norms in arithmetic for a country disclosed a serious discrepancy between industrial and rural areas. The suggestion was made, and appears likely to be confirmed by further research, that this might be explained by the greater number of single-teacher schools in rural areas. This in turn may lead to an inquiry into the staffing, equipment and methods of single-teacher schools. The records of previous researches should contain many valuable suggestions for further research, and it is advisable that the report of any piece of research should include a list of follow-up investigations.[1] The *reversal* of previous researches might in certain cases prove profitable. As a contribution to the discussion on Formal Training, Mr. W. H. Winch carried out in 1913 an investigation into "The Transfer of Improvement in Reasoning in School Children."[2] He applied tests in reasoning capacity, and after a course in problematic arithmetic, re-tested the subjects of the experiment with other reasoning tests of equal difficulty. It would be enlightening if this investigation were repeated, the initial and the final tests being problems in arithmetic and the training being provided by reasoning exercises. A neglected field of investigation is the *synthesis of previous researches.* It is incumbent on research to divide or analyse if it is to conquer, but the study of the individual child may reveal the common cause of different special disabilities[3]; thus left-handedness and mirror-writing, it is generally admitted, are closely associated; a reversal analogous to mirror-writing appears in drawing. In reading, however, we have examples of the reversal of the order of the letters, and the child reads "saw" for "was"; a writer on the "Psychology of the Three R's," commenting on this confusion, says: "The reason is, of course, that in recognising a word the total shape is the dominant factor, and the more contrasted the shapes are for the child the more helped he is in discrimination"; the treatment that would doubtless be prescribed in such a case would be special tachistoscopic practice, which, if our hypothesis is right, would be of little avail. Some speech disorders presenting serious difficulty in diagnosis have been found by phonetic analysis to display reversals in sounds. In investigations into spelling errors the substitution of "no" for "on" is classified as "inversion," but it is more likely also to be an example of reversal of direction. The same phenomenon appears in arithmetic, where it is likely to elude or mislead the analytical investigator. The child adds 7 + 9 and puts down as his answer 61; special training in notation is prescribed, whereas the child is quite well aware of the values of the digits, but merely writes them down in the reverse direction. Almost all the types of disabilities here enumerated have been encountered by the present writer in a child of whom he has intimate acquaintance, and this conjunction in a single child suggests an underlying common cause, namely, a failure of education to cultivate a fundamental sense of direction, which would have escaped specialist investigations. This instance indicates that synthesis in research should not be neglected. A more restricted type of synthetic research is the *border-line problem*, an example of which is the relationship between problem-solving in arithmetic and reading comprehension.[1]

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[1] Cf. R. R. Rusk, *The Training of Teachers in Scotland:* An Historical Review, p. 157.

[2] *The British Journal of Psychology*, XIII, Pt. 4 (April, 1923), pp. 370–381.

[3] Cf. R. R. Rusk, "An Illustration of Synthesis in Research," *Educational Research*, Supplement to *The Head Teachers' Review*, VII, No. 3 (September, 1929).

The school tends to be self-centred and to ignore or look with disapproval at the extra-school activities of pupils. Such *outside interests* are not only worth investigating on their own account, but may also provide original material for tests; more psychology, indeed, may be learnt from a toy-shop than from a textbook, and the competitions in children's newspapers might be exploited for research purposes.

The most productive source of research problems is a *healthy scepticism*. A distrustful attitude to the efficiency of current procedure is likely to jeopardise practice, but progress in education can be achieved only by continually submitting to review the routine of the classroom. The methods in use originated in a pre-scientific age; many are no doubt merely chance products, and it would be surprising if they proved the most dependable. The research worker cannot admit a practice, no matter how long established, which does not stand the test of experimental verification, and a general consensus of opinion on any educational topic merely prompts him to doubt it and investigate it. Thus in official and semi-official reports the statement: "All our witnesses are agreed," serves but as an inducement to list the view expressed among the topics for subsequent research. *An Interim Report of the Examinations Inquiry Committee* of the New Education Fellowship states[1]: "Behind these suggestions lies the sincere uneasiness which very many of our witnesses express concerning the effect of our system of examination upon nervous, highly strung children and on children who happen to be unready and slow." Arrangements were made in a Scottish county to test the validity of this view. Teachers were required to indicate on the schedule on which the pupils' names were submitted preparatory to the examination those who in their teachers' judgment were unlikely to do themselves justice; 2,805 pupils were entered for the examination, and of these 208 were so indicated. A comparison between the teachers' estimates and those of the examiners revealed that in only 32 per cent. of the cases was the teachers' judgment right, the other pupils either maintaining or improving their position. A random selection by the teachers would have resulted in a higher percentage. The "sincerity" of the uneasiness referred to in the passage quoted above is evidently misplaced, and if the other dicta of the witnesses have as little foundation, the futility of the procedure adopted in the preparation of such reports is apparent. Even the psychological break at 11 +, which is a prominent feature of the Board of Education Consultative Committee's *Report on the Education of the Adolescent*, has been questioned.[1] Official and semi-official Reports thus evidently offer a happy hunting-ground for the research student in search of problems.

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[1] Cf. H. R. Low, "Relation of Reading Comprehension to Arithmetical Ability," Scottish Council for Research in Education Supplement to the *Scottish Educational Journal*, No. 6 (December, 1931).

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[1] p. 12.

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[1] *Curriculum for Pupils of Twelve to Fifteen*, pp. 5–6, 19–23.

CHAPTER V

DEFINITION OF PROBLEM

PROBLEMS selected for research must be capable of precise formulation. The research attitude cannot be content with vague generalities, such as attributing success in teaching to the " personality " of the teacher and failure to the stupidity or laziness of the pupils. Many problems proposed for research by the initiated suffer from just such vagueness or illustrate the fallacy of many questions. The change of attitude demanded by research may be illustrated by a comparison of the general discussions on formal training, disciplinary education, or the " cultural " value of a subject, with the specific formulation of problems on transfer of training: Does the improvement resulting from the training on one definite type of material transfer to certain other types of material, or does it prejudice the acquisition of the latter? If it does transfer, how much is transferred? How is the transfer when it does take place, to be explained? In this connection we may be allowed to cite the formulation of an actual problem on this subject[1] :

> More specifically the problem was to determine whether the amount of such transfer can be increased by helping the pupils consciously to generalise the process and formulate, from the three types taught, a general method of procedure applicable to the related types ; by rationalising the process, that is, by considering the underlying principles ; and by a combination of generalisation and rationalisation.
>
> The following minor problems were also studied :
>
> 1. Is there a relationship between the amount of transfer and the mental ages of the pupils ?
> 2. Are there sex differences in transfer ?
> 3. Is the loss that occurs, in transfer from the specific type of example taught to the related types, a function of the dissimilarity between the types ?

The terms employed in formulating the problem must be free from ambiguity. We must define our terms with precision and employ them in such a sense that others can readily identify what we are really investigating. In a letter to *The Times* on "Scholarships for Research in Economics,"[1] Sir Josiah Stamp stated :

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[1] J. A. Overman, *An Experimental Study of Certain Factors Affecting Transfer of Training in Arithmetic*, p. 31. Baltimore : Warwick & York, Inc., 1931.

> A further object of the committee is to encourage similarity of method and terminology in different branches of social sciences in the several universities, in order to secure the advantage of interchangeability and comparability in the results of research work.

The Educational Research Association of America issued[2] some years ago a Report of its Standardisation Committee defining some of the terms employed in educational research. Thus it advises that "the term 'capacity' should be restricted so that it may connote just one thing : namely, inborn or undeveloped possibilities of behaviour. Ability should be regarded as the product of experience acting on capacity." In measurement the problem of validity is distinguished from the problem of reliability, the former dealing with what a test measures and the latter how consistently it measures. So incorporated have these measurement terms become in the terminology of research, that it is now customary in marketing tests not only to supply norms of achievement for different ages, but also to indicate the reliability co-efficient and provide an estimate of validity.

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[1] 11th July, 1928.

[2] *Journal of Educational Research*, IV, No. 1 (June, 1921), pp. 78–80.

While it is incumbent on research workers to avail themselves of such definitions, it would be a misfortune if their energies were diverted to quibbling over the logical definitions of terms.

CHAPTER VI

THE TECHNIQUE OF RESEARCH

THE technique of research is the body of precautions to be taken to avoid failure, or positively the procedure to be adopted if our results are to be valid. It has been devised by investigators to save later workers from the pitfalls which they themselves have encountered in their inquiries; their experience has been refined and recorded until it may be designated a method. Technique is to research what method is to teaching, or in a sense what logic is to thinking.

This last analogy provides an approach to the understanding of the technique of research. Mill's methods of induction, if we could satisfy them, would provide almost a complete technique of research, but they, rather tantalisingly, assume just those features which present most difficulty to the research worker, namely, origination of the problem and analysis of the conditions to isolate one changing factor. We have already dealt with the origin of the problem; the demand that the conditions should be analysed and so controlled that one factor alone is subject to change has been termed "the law of the single variable,"[1] and practically the whole technique of educational research has been so devised that experiments should conform to this law. It is an ideal difficult of attainment, for educational problems are unusually complex; even when all the factors are known, which seldom happens, for some are most elusive, the artificial isolation of one is extremely difficult, as a change in one factor generally modifies in some way the other factors. This explains why in most educational investigations we do not get beyond Mill's law of concomitant variations, and the best result we can hope to attain is a correlation co-efficient. Thus in testing such a simple process as the quality of handwriting, two aspects must be assessed separately—rate and quality or legibility. An increase in the rate may adversely affect the quality, and it is absurd to award marks for handwriting performed at a rate which would make the art of handwriting useless for ordinary purposes. A serious difficulty, but one that is not impossible to overcome, is to devise a formula whereby differences in the one factor can be converted into differences in the other, thus rendering possible comparisons of different samples. In most educational investigations we are faced with variations in such factors as age, grade, time of year, heredity, maturity, training and social status.

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[1] *Journal of Educational Research*, IV, No. 1 (June, 1921), pp. 58–60.

These difficulties have compelled Educational Research to devise its own methods. One of the earliest, now regarded as indispensable in most investigations, is the procedure of equivalent or parallel groups, the origin of which is credited to Schuyten,[1] but which was first employed in this country and has been extensively exploited by Mr. W. H. Winch.[2] One of the two equivalent or parallel groups of pupils serves as a "control group" in an investigation; it does not participate in the training, and as it is consequently unaffected thereby we can determine by its results whether the initial and final tests have been of equal difficulty, and even if the training to which the experimental group has been subjected has been prejudicial. Before the introduction of this arrangement we could not say whether the advantages claimed for some new method in teaching were really a consequence of the method or should more rightly have been attributed to the intelligence of the pupils, the additional time given to the subject, the enthusiasm of the teacher, or to a difference in difficulty of the original and final tests.

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[1] Ed. Claparède, *Experimental Pedagogy and the Psychology of the Child*, English translation, p. 238. London: Arnold, 1911.

[2] See W. H. Winch's researches referred to in this Monograph.

The means adopted by Experimental Psychology to eliminate space and time errors[1] have been generalised into the system of rotation employed in educational experiments to equalise varying conditions. In investigating the degree of difficulty of number combinations, for example, it would be inadvisable, in view of variations in attention, adjustment or adaptation, fatigue, etc., to maintain the same order throughout ; in repeated presentations we rotate the series, each member assuming in turn every position. So in testing pupils' preferences for school subjects, if we preserved the same order throughout in listing the subjects, the earliest members of the series would have the advantage.

The most notable contribution to the technique of educational research is the objective or standardised test. The term " objective " is applied to tests to distinguish the results got by them from subjective estimates or personal impressions. It implies that the conditions under which the tests are performed are kept constant, and that the marks awarded to any performance by the same judge at different times or by different judges at the same time should be the same. Such tests were originally devised in the interests of research work, but it is now coming to be realised that in fairness to candidates something of the same care should be exercised in all examinations on which important issues depend.

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[1] Cf. C. S. Myers, *Experimental Psychology*, I, pp. 191–192.

Uniformity is thus required (1) in setting or putting the test, (2) in the conditions under which the work is performed, and (3) in the assessment of the candidate's performance. Tests set should, if possible, contain all instructions, so that explanations, more or less helpful, by individual teachers are avoided; they should be so unequivocal that the pupil would not require any further enlightenment as to what a question means or what is required of him; in a word they should be fool-proof.[1]

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[1] Cf. e.g.:

P. B. Ballard, *The New Examiner.* London: University of London Press, 1923.

E. R. Hamilton, *The Art of Interrogation:* Studies in the principles of mental tests and examinations. London: Kegan Paul, 1929.

W. A. McCall, *How to Measure in Education.* New York: The Macmillan Co., 1922.

S. S. Brooks, *Improving Schools by Standardised Tests.* London: Harrap & Co., 1922.

S. L. Pressey and L. C. Pressey, *Introduction to the Use of Standard Tests.* Revised edition. Yonkers-on-Hudson: World Book Co., 1931.

G. M. Ruch, *The Objective or New-Type Examination.* Chicago: Scott, Foresman & Co., 1929.

C. Russell, *Standard Tests.* Boston: Ginn & Co., 1930.

With such a school subject as spelling, difficulty is experienced in securing uniformity of conditions in the setting. If words are dictated, and the pupils are seated at varying distances from the teacher, they may not hear equally well; some may have defective hearing, and we may consequently be testing auditory capacity, not ability to spell. If the same words are dictated by different teachers to different classes, there may be variations in pronunciation or intonation facilitating or obstructing the recognition of the word or its spelling, and thus introducing an unfair element into the test. To meet these objections an error-correction test has been recommended.[1] The word to be spelled is presented incorrectly in parenthesis. The child is directed to write it correctly on the dotted line, thus:

> We had a review in (addision) . . .
> I like to be in school on a (raney) day . . .

Teachers have, however, a strong, although it may be quite unjustified, prejudice against the presentation of the wrong form of the word, even when all the words given in parenthesis, as in this test, are known by the pupils to be wrong, and the psychological effect of presenting a wrong form to the pupil who knows it to be wrong is different from that of presenting doubtful spellings ; it has also to be remembered that the presentation of the wrong form is not the initial presentation. Nevertheless, to meet this objection on the part of teachers the present writer suggests that the form inserted in the parenthesis should be the phonetic transcription of the word reproduced in a standard dictionary used by the pupils ; the teacher who objects to this as likely to affect adversely the spelling of his pupils should forbid them to use dictionaries at all.

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[1] Frederick S. Breed, "New-Type Spelling Tests," *The Elementary English Review*, VII (March, 1930), No. 3, pp. 54–56.

The conditions under which tests are performed should be kept as uniform as possible. The schools have evolved a technique for this which may be regarded as highly satisfactory. In addition to a rigorous compliance with the instructions on the part of the invigilator the sole requirement ordinarily demanded by objective testing is the accurate timing of certain items.

The necessity for objective marking has arisen from the fact that in large-scale examinations the correction or evaluation cannot be undertaken by one examiner. Methods must consequently be devised to eliminate or reduce variations in marking. These take two forms. The tests set may admit of an answer which can be marked either right or wrong. When this is not possible, a statistical technique is applied to equate the marking of different examiners to the same standard. The former method is to be advised. It is not only more precise, but also results in a considerable saving of time in correction and does not require special expert assessors. For subjects where it is impossible to restrict a candidate's performance to a right-wrong or multiple-choice form, objective scales of measurement have been devised to reduce the variations in different examiners' marks, and even to introduce some consistency into the marking of one individual. Handwriting scales have been instanced above, and scales are now available for most of the other school subjects. The use of such scales is imperative where different assessors are engaged in evaluating educational products like writing, drawing, etc., and the distribution of marks of the various examiners should be graphed and corrections made where discrepancies appear.

Objection has been taken to the new-type tests on the ground that they involve mere recognition rather than recall, reproduction rather than originality,[1] but it is the task of Educational Research to devise tests for the higher processes which will have something of the same "reliability " as the tests at present in use. It need only be recalled in this connection that the charge made against Experimental Psychology in the early days, that its methods were restricted to testing elementary sensory processes, no longer holds, as it is now in a position to investigate such complex mental processes as thinking and willing.

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[1] Hulsey Cason, "The Essay Examination and the New-Type Test," *School and Society*, XXXIV (26th September, 1931), No. 874, pp. 413–418.

The application of objective tests presents to teachers an unlimited field for repetition research of the most valuable type.

Thus is Educational Research evolving and formulating its own distinctive technique. Only a few years ago the subject was not advanced sufficiently to have its special technique formulated, and the only way to qualify oneself for research was to get in touch with someone who had previous experience along similar lines and acquire the procedure from him ; now the technique is embodied in numerous recently published works so that all who read may run.

CHAPTER VII

RESEARCH AND THE TEACHER

We must now consider what the teacher may expect from research, and what, contrariwise, research requires of the teacher. According to Buckingham,[1] research

> will not only powerfully and rapidly develop the technique of teaching, but will also react to vitalise and dignify the work of the individual teacher. It is my firm belief that the emancipation and professionalising of the teachers' calling rests far more upon the originality, insight and expertness which the teacher evinces than upon any considerations having to do with salary, tenure or legal status. Society cannot be compelled to respect anybody or anything. The surest way to win respect is to be respectable. If, as has often been observed, there is no such general belief in the expertness of those engaged in other occupations, it is worth considering whether the public is right about

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[1] B. R. Buckingham, *Research for Teachers*, p. iv. New York: Silver, Burdett & Co., 1926.

> it—whether the teacher really has, to the extent that the professional or craft worker has, a special competency peculiar to his calling. In my judgment, nothing would so effectively obtain for the teaching body the professional expertness and the reputation for having it as the open-eyed, open-minded scientific spirit of inquiry.

When the teacher's technique is based on research, teaching will no longer be regarded as one of the black arts, but will assume the status not of a dismal science, but of a progressive and enlightened procedure. The more highly skilled and better informed teacher will find new interest in his work and a new confidence in his own abilities.

As the office of the teacher is thereby dignified, there will be a corresponding decline in the rôle of the amateur in Education. Education is at present one of those unfortunate subjects on which, like Economics at an Election time, everyone is an authority. Research, we trust, will alter this. As Sir John Adams has said[1]: "Gone is the old easy approach to the educational platform. Day by day it is requiring more courage to get up in an educational meeting and talk at large."

There is constant criticism of the teacher's work, or rather of the products of his work—much of it no doubt justified. But what one is inclined to challenge is the underlying assumption that the defects that are indicated or admitted can be removed merely by intensified effort on the part of the teacher or of the pupil. Such intensification of effort will lead only to increased strain on the teacher and increased resentment on the part of the pupil. Research will doubtless reveal that the failure to get the expected results is due to inefficient and uneconomical methods, and will lead us to seek a change of procedure rather than a mere intensification of effort. Research should accordingly, by putting more scientific weapons at the disposal of the teacher, economise effort and increase efficiency ; it is in fact likely to lead to what Ballard[1] has termed "leisurely methods" :

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[1] *The Teacher's Many Parts*, p. 45.

> In nearly all schools the early number work is now individual, and in many schools it is spontaneously undertaken by the children. They receive no formal lessons, and sometimes indeed are allowed to neglect number for days and weeks together. The teachers no longer strain and strive to impart new numerical ideas. And yet the average number of items correct at a given age is the same to-day as it was fifteen years ago. The

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[1] *Teaching the Essentials of Arithmetic*, p. 57.

> leisurely methods of to-day are just as effective as the strenuous methods of the past.

The same conclusion was reached as the result of tests on children's testimony ; teachers formerly spent much time in the old object-lesson days on teaching young pupils the qualities of objects, but the use of terms denoting qualities appears spontaneously at a certain stage of development without the teacher's help. By the introduction of modern incentives pupils' handwriting can be kept up to the required standard without copy-book exercises. The substitution of silent reading or reading for meaning for oral class reading (which did not succeed in teaching the pupil to comprehend printed matter, but merely to " keep the place "), will economise the teacher's time and temper. In many cases pupils are bored by being taught what they already know merely because it is in the syllabus of work. A diagnostic test applied before commencing a subject might reveal that much that would otherwise have been taught may be assumed ; thus an investigation into " The Child's Knowledge of Number on Entering School "[1] suggested that children who on entering school had quite an extensive acquaintance with cardinal numbers had little or no appreciation of the ordinal arrangement, whereas the school teaching concentrates on the cardinal arrangement and ordinarily neglects the ordinal. By research on such lines time will be saved for real education, and the pupils' energies released for such.

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[1] *Educational Research*, Supplement to *The Head Teachers' Review*, IV, No. 1 (January, 1924).

The teacher will also find that the testing devices employed in research in education will come to be utilised as teaching methods. The Montessori exercises are to a large extent psychology laboratory tests employed for training instead of testing. Thorndike's read-and-answer situation tests have, as already mentioned, been responsible for the great impetus recently given to silent reading or reading with intelligence. Freeman's analytic scale of handwriting can obviously be applied in the teaching of the subject. Certain mental tests, for example Stern's picture tests,[1] could be made the topics for English composition. The tests which research has evolved will thus extend the teacher's repertoire and enrich the pupils' education, because they are usually nearer to life than the formal content of the older instruction.

The teacher might also expect from the adoption of the checking devices necessitated by research work, some relief from the drudgery of correction. The new types of recording cards, filing arrangements, etc., will doubtless also become features of the new education as research methods come to be practised in the schools.

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[1] "Untersuchungen über die Intelligenz von Kindern und Jugendlichen," *Beihefte zur Zeitschrift für angewante Psychologie*, XIX, p. 23.

The teacher may also derive benefit from the objective testing of his own efforts ; inspection instead of remaining a matter of arbitrary personal opinion may in time avail itself of the research procedure and adopt a scientific attitude.

If research will benefit the teacher it will also make certain demands on him. The claim to omniscience on the part of the teaching profession will have to be abandoned. There was a time when teachers took all knowledge for their province and proposed to teach all things to all men ; now we leave omniscience to the daily press. Research will teach us humility, that there is much still to be discovered about the educative process. Teaching will through the adoption of the research attitude become even more than ever the great adventure.

Research will put an end to the *a priori* criticism and rejection of new methods. If one is not prepared to accept the results of a method based on scientific research, one must repeat the investigation and disclose the flaw in the procedure.

The teacher will be expected to display a willingness to further research by affording facilities for its prosecution in schools, and the greater the number of teachers who are initiated into the methods of research the more readily will this be achieved. The teacher will also have the opportunity of completing the task of the research worker by putting the latter's results to the test of practice. It will be his privilege to turn the thought of the researcher into a practical reality. Winch has issued a warning that " If teachers stand aside and do not help, they will only have themselves to thank if methods are imposed upon them from the results of experiments which they do not understand, which are not really applicable to their work and in which they have no share." [1]

In his *Research for Teachers* Buckingham has said [2]:

> I distinguish the modern teacher from the teacher of twenty-five or thirty years ago as a person who desires to have at his command the results of that surprising period of research which entered upon its present stage about the year 1910.

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[1] Quoted by Buckingham, " The Philosophy and Organisation of Research," *School and Society*, XXIX (15th June, 1929), No. 755, p. 764.

[2] p. 81.

With the extension of the facilities for training in, and the wider dissemination of the results of, research, may it soon be possible to apply the term "modern," in Buckingham's sense, to all teachers!

CHAPTER VIII

RESEARCH AND THE EDUCATIONAL CLINIC

THE very general demand at present for the institution of Child Guidance Clinics raises the question as to the relationship between such Clinics and the Research movement. The existence of the Clinics is evidence that mistaken methods are in operation in the schools, to the detriment of the pupils. These difficulties can be attacked in two ways: one—the remedial or curative; the other—preventive and instructional. The Clinic adopts remedial methods, but Research should establish preventive methods. To begin with the Clinic and not with Research is thus to begin at the wrong end. A Clinic might be kept fully employed diagnosing arithmetical disabilities because schools were employing unsatisfactory methods of teaching, say, subtraction; or setting right speech defects induced by wrong methods of teaching reading, or attempting to cure writer's cramp caused by excessive finger movements in handwriting; in fact, an emotionally unstable teacher with a sarcastic tongue could keep the staff of a Clinic in constant employment. It is evidently of little avail for clinical psychologists and educationists to clear up special disorders and disabilities if teachers are creating others faster than the Clinic can deal with them. Research, by devising and securing the general adoption of scientific methods, is thus paramount ; but it will not dispense with the need for Child Guidance Clinics, for the school, in spite of a common belief to the contrary, is not responsible for all the evils of society and all the disabilities of pupils ; innate factors and home conditions must accept some share of the blame, and to deal with difficulties arising from these sources the Clinic is indispensable.[1] Research and the Educational Clinic are thus complementary.

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[1] William Moodie, " Child Guidance and the Schools," *Educational Research*, Supplement to *The Head Teachers' Review*, VIII, No. 2 (March, 1931).

CHAPTER IX

ORGANISATION OF RESEARCH

RESEARCH cannot be relegated to the haphazard efforts of individual enthusiasts, nor can it be effectively undertaken by a committee each member of which is engaged in other more pressing duties. If it is to be profitably installed, the Research movement must have a local habitation and a name, and must also employ permanent officials devoting themselves exclusively to its administration. This implies the establishment of a Bureau or Institute of Educational Research.

For fruitful precedents for the establishment of such Bureaux or Institutes we must turn to America, where, in June, 1926, there were in operation one hundred and five such institutions.[1] By contrast the position in England at the same date is stated as follows[2]:

> Educational research in Great Britain is still largely a matter of individual initiative and expense, although some interest is shown

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[1] Harold B. Chapman, *Organised Research in Education*, p. 20. Bureau of Educational Research Monographs, No. 7. Columbus: The Ohio State University Press, 1927.

[2] op. cit., p. 13.

> by educational authorities, and modifications in school procedures have taken place in consequence. The general attitude of the country is expressed by Winch as follows:
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> "England permits but does not financially support research in education; and the upshot is that, with the possible exception of France, there is less provision for educational research than in any of the leading countries of the world."

Thanks to the institution in 1928 of the Scottish Council for Research in Education, Scotland is recovering its position among "the leading countries of the world," and it should be a comparatively easy matter now to establish on analogous lines similar Councils in London, the Northern Counties of England, etc.

The function of a Bureau would be to collect, collate and disseminate the results of research, making these available on demand to individual investigators, teachers, Directors of Education, School Medical Officers, Education Committees, the public and the press. The cost and the space required make it now prohibitive for any one individual to maintain at his sole command complete files of all research journals, bulletins, reports, etc.; the best he can hope for is to know where investigations have been recorded or how they can be traced. A Bureau should also possess and make available on loan to authenticated investigators all works of reference, statistical tables, mechanical aids to calculation, copying and duplicating apparatus. If it does not possess on its own staff qualified statisticians and translators, it should retain the services of a panel of such specialists to whom it could refer the original research worker. It should be able to put at the disposal of Education Committees skilled assistance in investigating educational problems or in assessing pedagogical practices; one of the pressing needs which a Bureau might meet is the presentation of the results of educational research at present available in a form suitable for direct application in the schoolroom.[1] A Bureau of Educational Research need not confine its activities to teaching or learning methods, but might collate and distribute information on school administration, school planning, new equipment, school books, curricula, educational statistics, foreign systems. Through such a Bureau each Education Committee would have at its disposal the experience of all the other Local Education Authorities; through it they could pool their resources.

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[1] P. B. Ballard's *Teaching the Essentials of Arithmetic* is an illustration of what can be done for one school subject.

Not only should a Bureau assemble and disseminate the results of successful investigations, but it is also equally important for the advancement of a subject that, as was pointed out by the President of the Engineering Section of the British Association at the 1927 Meeting[1] and emphasised later by Sir Josiah Stamp,[2] failures should be carefully recorded. Speaking of Invention, the former said :

> Of the hundreds of inventions which have been abandoned as failures, or of possibly revolutionary inventions left incomplete simply from lack of capital or lack of courage, no record is available to those who come after and who might carry them on to success. Has every inventor for all time to start from scratch ? The same difficulties crop up time after time in the development of inventions, yet every new inventor has to tackle the difficulties *de novo*, and fortunes are wasted in the process.

And concluding his address, he remarked :

> Would it not be in the best interests of science to remember the failures as well as the

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[1] *Report of the British Association for the Advancement of Science*, 1927, p. 125.

[2] *The Times*, 24th March, 1928.

> successes, and to encourage all serious workers in important fields of research to furnish in the common cause a record of their work, even when their aim has not been achieved, giving a faithful account of all the difficulties and all the efforts made to surmount them? Who knows but that many of the so-called failures of yesterday may only be waiting for other hands to-day to carry them on to a greater success than the world has yet known? Left to themselves they will lie in oblivion, yet for all we know, two of them may fit together and provide the answer to one more of the riddles of the universe.

This applies equally to educational research, and it is obviously one of the functions of a Bureau of Educational Research to preserve the records of such failures.

So far as the evidence of history extends, says Gomperz in his *Greek Thinkers*,[1] an organised caste of priests and scholars, combining the necessary leisure with the equally necessary continuity of tradition, was at all times indispensable to the beginnings of scientific research. In maintaining such continuity of tradition, which is likewise indispensable for the development of research, a

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[1] T. Gomperz, *Greek Thinkers*: A History of Ancient Philosophy. English translation, I, p. 43. London: John Murray, 1901.

Bureau of Research has undoubtedly an advantage over any individual. The incomplete character of most educational researches is a feature which has not escaped notice or criticism,[1] and a Bureau could assist and supplement the work of the individual researcher. Continuity in the personnel of the Bureau should not be overlooked; commenting on the discontinuance of a successful Educational Bureau the Assistant-Director described the difficulties involved as follows[2]:

> I am not at all sure that, even if I had remained . . . I should have gone on with the work. It is true that the undertaking was apparently successful and the Board was supporting the preliminary investigations into a much more extensive enterprise of the same nature. As I look back on it now, it seems to me that the chief obstacle would have been the great difficulty of getting men to carry on the work who were adequately trained to do so, who had sufficient maturity and breadth of appreciation of the purposes implied and who at the same time would be content to stay with the enterprise long enough to make substantial contributions. Educational re-

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[1] Cf. G. M. Whipple, "The Improvement of Educational Research," *School and Society*, XXVI, No. 661 (27th August, 1927), pp. 249–258.

[2] H. B. Chapman, op. cit., p. 119.

search of any kind is in its nature a long-drawn-out affair. It is easy enough to assemble facts in short order sufficient to warrant preliminary hypotheses. The verification of such hypotheses through modification of methods and modification of administration is a long task.

To justify its existence some positive contribution must be made by a Bureau of Educational Research ; we cannot all exist by merely taking in one another's washing. A Bureau may inspire and assist individual investigators by putting at their disposal its special facilities, subsidising their efforts and publishing their results. It can also, for comparative purposes, enlarge the scope of an investigation which an individual worker would have himself to abandon. Through its prestige it can enlist the support and co-operation, in a way scarcely possible to an individual worker, of different educational bodies in projects of national significance ; thus the Scottish Council for Research in Education has for a mental survey of a complete age-group on a nation-wide scale been accorded facilities for the application of its test by every Education Committee and by practically every private school in Scotland.

CHAPTER X

LIMITATIONS OF RESEARCH

THERE is only one fallacy in Logic, and that is having more in the conclusion than the premises warrant. It is a fallacy frequently committed by research workers, or rather by those who avail themselves of the results of research investigations, and we should like to enter an emphatic protest[1] against sweeping social generalisations, usually of a reactionary and anti-democratic type, being drawn from data derived from a very restricted psychological or pedagogical inquiry.

Education is a social or political science based on a metaphysic or philosophy. By reason of the social nature of the science most of the problems are highly complex and its philosophical nature demands that in their solution we must reckon with ultimate values. The weapons of the research worker have been devised to tackle the problems raised in the positive sciences and in the sciences of physical measurement, and the ambition to be strictly scientific leads to overlooking phenomena to which these weapons are not applicable and may result in ruling out the really significant factors in educational problems. The increasing recognition of the importance of the curriculum in education, for example, has naturally led to the application of research methods to curriculum construction, but after the expenditure of an amazing amount of ingenuity and activity the work is arrested and the results so far attained challenged by questions raised regarding the adequacy of the criteria employed.

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[1] For similar protests see W. C. Bagley, *Determinism in Education.* Baltimore: Warwick & York, 1925; *Education, Crime and Social Progress.* New York: The Macmillan Co., 1931.

The principle of modern curriculum construction was enunciated by Spencer in his well-known chapter entitled " What Knowledge is of Most Worth ? "[1] There he affirms that our first step must obviously be to classify, in the order of their importance, the leading kinds of activity which constitute human life. To this principle no objection can be taken, but there is considerable divergence of opinion as to the order of importance of human activities; thus Sir T. Percy Nunn[2] maintains that the things that have universal human value are the things of most importance in education, and Dewey[1] agrees that the curriculum must be planned with reference to placing essentials first and refinements second, yet these two educationists are diametrically opposed in regard to the human activities to which they assign the greatest importance. Dewey claims[2] that man's fundamental common concerns centre about food, shelter, clothing, household furnishings and the appliances connected with production, exchange and consumption, whereas Nunn contends[3] that among the strains or currents in a national tradition the highest value belongs to those that are richest in the creative element, explaining :

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[1] *Education : Intellectual, Moral and Physical*, ch. i.

[2] " The Education of the People," Presidential Address to Section L (Educational Science) of the British Association, 1923, p. 266.

> These are themselves traditions of activity, practical, intellectual, aesthetic, moral, with a high degree of individuality and continuity, and they mark out the main lines in the development of the human spirit. Consider what man has made of poetry and what poetry has made of him ; what a noble world he has created out of the sounds of vibrating reeds, strings, and brass ; think of the expansion of soul he has gained through architecture and the arts of which it is the mother and queen ; of the achievements of his thought, disciplined into the methods of mathematics, the

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[1] *Democracy and Education*, p. 225.

[2] op. cit., p. 234.

[3] op. cit., p. 267.

> sciences and philosophy. Do we not rightly measure the quality of a civilisation by its activities in such directions as these? And if so, must not such activities be typically represented in every education which offers the means to anything that can properly be called fullness of life?

Dewey thus apparently plumps for food and furniture, Nunn for poetry and philosophy. To such contradictory conclusions does the slightest shift in philosophical orientation lead that surely research seems justified in attacking the problem with the more precise technique at its disposal.

Spencer's principle that we should classify in the order of their importance the leading kinds of activity which constitute human life, with all the refinements that statistical technique can lend it, now takes the form of "frequency of use." The principle in its new form has all the plausibility of a successful technical device; it nevertheless proves on examination to require correction and completion by philosophical considerations, and protests against its finality are now forthcoming from various sources. The objections take two forms: (1) against the principle, (2) against its application.

The difficulties in applying research methods to problems of curriculum construction have not escaped some writers; thus Douglas[1] states that such difficulties "are great and discouraging—much greater than those attending the application of research methods to the natural sciences"; and Buckingham,[2] whose contributions to educational research entitle his criticisms of its technique to be treated with respect, contends:

> Sometimes the very attractiveness of statistical technique leads to our undoing. Under the influence of statistical method, our procedure tends to lose flexibility, and to harden into set forms. When we decide to use measurement and the analysis that measurement permits, we put our trust in precision, accuracy and definition. This is desirable up to a point, and in some kinds of work it is desirable all the way. But there are wide areas of thought where precision is not possible or where it can only be attained by non-statistical methods. To let statistics aid our thinking is imperative so far as statistics applies, but to let it dominate all our thinking is to court disaster. Indeed, there is in some

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[1] Harold R. Douglas, "The Contribution of Research to Secondary School Curriculum Construction," *School and Society*, XXXII (27th September, 1930), No. 822, pp. 411–416.

[2] B. R. Buckingham, "The Philosophy and Organisation of Research," *School and Society*, XXIX (15th June, 1929), No. 755, pp. 755–764.

> quarters a lamentable tendency to substitute statistics for creative thought.

And he adds: "I believe this is true in some of our curriculum research."

The first objection urged against the "frequency of use" criterion is that the curriculum is not an end in itself, but a means to the attainment of the aim of education, and the aim of education cannot be determined by such a principle as "frequency of use." Douglas[1] in this connection, with some exaggeration, remarks:

> It is questionable whether we can determine by research method or any other methods what is the ultimate good by which all procedures may be measured. Philosophy has for centuries been devoted to the question of the ultimate good and apparently is little closer now to a solution than at any previous time. We have almost as many hypotheses as there are philosophers.

Although "frequency of use" may be profitable in deciding the content of the individual subjects of instruction, it can afford but little guidance in determining the relative values or weightings of these subjects and the influence of each on the lives of the pupils. Douglas explains[2]:

> Except as we confine each project of curri-

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[1] loc. cit. [2] ibid.

culum research to specialised, logical rather than natural, fields of subject-matter, mathematics, French, etc., and measure by means of the peculiar contributions of such subjects, we are confronted with the discouraging task of attempting to disentangle the effects of the instructional materials under study from other instructional materials and from the effects of other elements of the environment on the subjects of the experiment. While it is not entirely impossible to do so, the difficulty in holding constant all other stimuli calculated to affect learning of the types by which the effects of the experimental variable will be judged, is so great that the number of experiments of broad scope will, of necessity, be much smaller than is desirable.

A further objection is that " frequency of use " provides us merely with an average of current opinions or practices ; it takes things as they are, the present stage of civilisation with all its imperfections as final, and implies that Education should prepare the child for such a world, leading Buckingham to complain[1] :

> Whether with reference to spelling or any other subject of the curriculum, whatever the much-discussed aim of education may be, it

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[1] "The Philosophy and Organisation of Research."

> contemplates something more than the round of common experiences, something richer than the elemental facts of life. Moreover, it is only by providing for more than is now generally available that progress is possible. Here as elsewhere in the application of scientific procedure to education, a sound philosophy—as well as a sound common sense—must be invoked to save the scientific procedure from itself.

Dewey, who has much less sympathy with the application of a scientific technique to educational problems, has likewise emphasised this danger[1]:

> The shortest cut to get something that looks scientific is to make a statistical study of existing practices and desires, with the supposition that their accurate determination will settle the subject-matter to be taught, thus taking curriculum-forming out of the air, putting it on a solid factual basis. This signifies, in effect and in logic, that the kind of education which the social environment gives unconsciously and in connection with all its defects, perversions and distortions, is the kind of education the schools should give consciously. Such an idea is almost enough to cause one to turn back to the theories of

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[1] J. Dewey, *The Sources of a Science of Education*, pp. 72–73. New York: Horace Liveright, 1929.

the classicists who would confine the important subject-matter of instruction to the best of the products of the past, in disregard of present and prospective social conditions. It is hard to see any cause for such a procedure except a desire to demonstrate the value of "educational science" by showing that it has something immediate and direct to furnish in the guidance of schools.

The criterion of "frequency" is in conflict with the principle of organisation or system in teaching; it would lead to disjointed instruction, to unnecessary gaps in the pupil's knowledge. Thus[1] "one investigator secured from school children the problems which their parents had occasion to solve. He reported that 96 per cent. of all the fractions used were included in this list of ten: $\frac{1}{2}$, $\frac{1}{4}$, $\frac{3}{4}$, $\frac{1}{3}$, $\frac{2}{3}$, $\frac{1}{8}$, $\frac{3}{8}$, $\frac{1}{5}$, $\frac{2}{5}$ and $\frac{4}{5}$." Would this justify us in neglecting to teach $\frac{3}{5}$ when we were teaching $\frac{1}{5}$, $\frac{2}{5}$ and $\frac{4}{5}$? This defect might nevertheless be easily overlooked in investigations on a larger scale or with content of a more complex nature.

The mathematical form which the results attained by the application of the "frequency of use" principle assume, tends to rivet on schools under the guise of scientific technique a formalism in instruction ; this is evidently the case with certain spelling lists derived by means of this principle. A warning against this danger has been issued by Dewey[1] :

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[1] Instanced by B. R. Buckingham, "Statistics and Modern Educational Thought," *School and Society*, XXXI (22nd March, 1930), No. 795, pp. 383–384.

> Exaggeration of their [exact quantitative determinations] importance tends to cramp judgment, to substitute uniform rules for the free play of thought, and to emphasise the mechanical factors that also exist in schools. They contribute at most to the more efficient working of present practices in some subjects. They have already been fruitful in securing eliminations, especially in the more routine skills, such as the three R's. But they do not give any help in larger questions of reconstruction of curriculum and methods. What is worse, they divert attention and energy from the need of reconstructions due to change of social conditions and to the inertia of traditions of the school system.

An assumption underlying the "frequency of use" criterion is that emphasis in teaching should correspond with frequency of use in life. Buckingham remarks[2] that the idea almost seems to be that since 96 per cent. of the fractions in use make up a list of no more than ten, something like 96 per cent. of teaching emphasis should be placed upon these ten fractions, or, he asks, if one hundred words constitute 60 per cent. of the writing people do, shall we say that 60 per cent. of the teaching of the schools in spelling and language should be devoted to the one hundred words of most frequent occurrence—to *the*, *and*, *but*, *to*, *be*, etc.? The fact is, he maintains, that frequency of use offers no guide to emphasis in teaching. We should require on quite other grounds to decide how frequently an item should occur before we were justified in teaching it, and the "frequency of use" principle does not enlighten us where to draw the line. "Because of its difficulty or because of its value (determined upon other than a frequency basis) it should perhaps be taught with an emphasis which has little reference to the number of times it will be used."[1] In a previous article already cited, Buckingham [2] has suggested that to a certain extent there is an inverse relationship between difficulty of learning and frequency of use, that some elements of school subjects, precisely because they are frequently used and hence often repeated, do not need to be taught at all. Importance and frequency may likewise in certain cases be related inversely, and the writer has suggested to a class of gay girl graduates that a question which, if they are fortunate, may only once be put to them may be more important for them than questions which they are answering every day.

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[1] op. cit., pp. 65–66.

[2] "Statistics and Modern Educational Thought," *School and Society*, XXXI (22nd March, 1930), No. 795, pp. 383–384.

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[1] "Statistics and Modern Educational Thought."

[2] "The Philosophy and Organisation of Research."

Apart from these general criticisms objection has likewise been taken to specific frequency studies on the grounds that they are not sufficiently representative of adult experience and that they tend to disregard the pupils' present needs. Buckingham[1] instances a list which purports to consist of the thousand commonest words, presumably Ayres's,[2] in which we do not find the names of our daily meals—neither *breakfast* nor *lunch*, *dinner* nor *supper*. Only the *horse* is mentioned among domestic animals. The *dog* and the *cat*, the *cow* and the *sheep* find no place in the list. On the other hand, among the " thousand commonest words " we actually find : *preliminary*, *recommend*, *impossible*, *assure*, *committee*, *investigate*, *national*, and a number of terms of apparently legal meaning such as *property*, *judgment*, *testimony*, *complaint*, *agreement*, *witness* and *conviction*. It is evident that before spelling lists are prescribed for formal learning by pupils it is advisable to check the sources from which the words have been derived. Ayres states[1] that more than two-thirds of the material from which his list was compiled consisted of personal and business letters, and at the outset of the investigation the question should have been decided whether or not it was the function of the school to teach pupils to spell business terms.

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[1] " The Philosophy and Organisation of Research."

[2] Leonard P. Ayres, *A Measuring Scale for Ability in Spelling*. New York: Division of Education, Russell Sage Foundation, 1915.

The "frequency of use" studies make adult experience dominate instruction to the neglect of the pupil's immediate needs and interests. The pupil is thereby deprived of the incentives to learning which these interests afford, and is thus required to learn much in advance of the situation in which the words will be used. Buckingham appropriately points out[2] that a child cannot write of his play without using such words as *hide*, *jump*, *swim* or *fish*, and these words are omitted from the thousand said to be most frequently used. He can scarcely write of the barnyard without requiring such omitted words as *hen* and *egg* ; he cannot write about his *garden* nor the *baby*[3] at home ; nor about the *moon*, the *sun*, the *sky* nor the *stars*. Yet these are the things within his experience.

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[1] op. cit., p. 10.

[2] ibid.

[3] Included, however, in Ayres's list.

They are, therefore, the sort of topics about which we should expect him to write.

Sufficient illustration has been afforded, we believe, to indicate the need for the critical evaluation not only of the results of research, but also of the principles on which research is based, and this critical evaluation is the function of a philosophy of education.

In Education the best is yet to be ; the problems of Education are " telic," the realisation of ends which are the product of creative imagination and the verification in practice of experiments that have not been tried before. The strictly scientific attitude to Education tends to obscure these issues. The current view in modern Education, influenced by Dewey, is that all our experience is of the research type, our attitude always that of problem solving, but some of us have even hazarded the conjecture that man differs from the problem-solving animals in that he not only meets the situation confronting him but can also create a new situation and originate a problem ; the human mind is not always shackled to external conditions, but is at times moved by some internal impulse, by the light that never was on sea or land ; it is then in the highest sense a law unto itself. Education, by its reliance on research, must never fail to realise that in addition to its practical practitioners and its skilled investigators it stands in need of men and women of imaginative insight who look beyond the present and behold the vision splendid. If this vision should fade into the light of common day, not only will the people perish, but research itself will become but a sterile futility.

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